

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.

Petitioner

v.

IMMERVISION, INC.

Patent Owner

Case IPR2023-00471

Patent No. 6,844,990

PATENT OWNER'S SUR-REPLY TO PETITIONER'S REPLY

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EXHIBIT LIST

Exhibit No.	Description
2001	Declaration of James F. Munro
2002	Excerpt from Tinku Acharya & Ajoy K. Ray, <i>Image Processing Principles and Applications</i> (2005) (pp. 23-25)
2003	EV76C560 CMOS Image Sensor Datasheet from e2v Semiconductors SAS (2011)
2004	Excerpt from Michael P. Keating, <i>Geometric, Physical, and Visual Optics</i> (2 nd Ed. 2002) (pp. 347-350)
2005	U.S. Patent Application Publication No. 2004/0201764
2006	February 15, 2024 Deposition Transcript of David Kessler, Ph.D.

I. INTRODUCTION

Petitioner's case for unpatentability of the challenged '990 Patent claims depends upon the PTAB adopting its reading of "magnification adjustment" in Shiota's paragraph [0023]. To obtain institution, Petitioner unequivocally relied on paragraphs [0024]-[0026] for its interpretation of paragraph [0023]. The Reply now disavows Petitioner's earlier arguments upon recognizing the error – that paragraphs [0024]-[0026] do **not** support its position – leaving Petitioner scrambling for evidence. At the very least, Petitioner's sudden souring on paragraphs [0024]-[0026] strains the credibility of the arguments set forth in the Petition and in Dr. Kessler's original declaration on whether Shiota teaches the claimed feature of "displaying the obtained panoramic image by correcting the non-linearity of the initial image, performed by retrieving image points on the obtained image...using at least...a size L of the obtained image."

To fill this gap, Petitioner alleges that Patent Owner takes Dr. Kessler's analysis out of context. In reality, Petitioner improperly isolates paragraph [0023] from the rest of Shiota's disclosure, despite language that would cause a POSA to further consider Shiota's remaining disclosure. Petitioner also introduces evidence showing normalization is common in optics. But not all of Petitioner's evidence relates to image size, and none of the new evidence shows using image size in the manner Petitioner seeks to bestow upon Shiota's "magnification adjustment."

Moreover, Petitioner's rationale is explicitly attenuated. Petitioner argues magnification is necessary to account for image sensor size, but then repeatedly argues magnification equates to image size "by extension." This is illogical since Dr. Kessler acknowledges image size and sensor size are not coextensive with one another.

Petitioner also tries to compare Shiota's teachings with the '990 Patent's described algorithm but leaves out a critical difference. The '990 Patent algorithm shows an example of how to use the image size to retrieve image points in the obtained image. In contrast, and as acknowledged by Dr. Kessler, the final coordinates derived by the algorithm recited in Shiota remain normalized. Thus, Shiota's algorithm does not support Petitioner's interpretation of paragraph [0023]. Nor does the belated reference to Baker's "edge detection," which also fails to teach the operations recited in claim 27.

Patent Owner therefore requests the PTAB find claims 2, 4, 27, 29, and 30 of the '990 Patent ***not*** unpatentable.

II. ARGUMENT

A. Petitioner's Rebuttals Contradict its Own Prior Briefings and Provide Little Support for its Strained Reading of Shiota

1. The Reply Plays Revisionist History with the Previous Importance of Shiota's Paragraphs [0024] and [0026] to Petitioner's Arguments

Petitioner's pre-institution arguments attached great significance to paragraphs [0024]-[0026] for understanding "magnification adjustment" in paragraph [0023]:

As the Petition explains, the '990's prosecution did not reference ¶ 23 of Shiota (shown below; annotated), which provides that (1) image size (referred to as image circle diameter) differs according to the image pickup device's size, and (2) the image transformation operations assume the image's size as 1 and perform "magnification adjustment" in "actual[] use" where the image and image pickup device may have different sizes. Petition, 50-51, 77-78. Petitioner highlights the significance of this unrecognized disclosure, *offering expert testimony explaining how a POSITA reading this disclosure in the context of ¶¶ 24-26 (describing that the parameters for image transformation are "obtained from" the "magnification of the image") would have understood that the ¶ 23 reference to "magnification adjustment" during image transformation accounts for the image pickup device's actual size (i.e., image disk)—and by extension, the image's actual size. Petition, 50-51, 77-78; APPLE-1003, ¶¶205-207.*

Pet. Reply to POPR (Paper No. 8) at 1-2 (emphasis added); *see also id.* at p. 3 (explaining the Examiner did not “actually consider or rely upon the Petition’s disclosures in ¶ 23 of Shiota for the above-recited claim 27 feature, and that *she similarly did not consider related disclosures in ¶¶ 24-26 for this same feature*”)(emphasis added). Realizing the correlation actually undermines its interpretation of Shiota, Petitioner seeks to walk back Dr. Kessler’s testimony about the interplay of paragraphs [0024]-[0026] and “magnification adjustment” in paragraph [0023]. Reply at 13-14. Petitioner and Dr. Kessler now contend they cited those passages just for “summary teachings of Shiota’s overall image transformation process.” *Id.* at 13; Ex. 1023 at ¶¶ 64-65.

But Dr. Kessler’s attempt to retroactively rewrite his earlier declaration fails. Discussing Shiota’s paragraph [0023], Dr. Kessler’s new declaration repeatedly emphasizes the importance of Shiota’s “magnification adjustment” statement and its equivalence with “scaling.” *See e.g.*, Ex. 1023 at ¶¶ 60-63. Paragraph 205 in his original declaration, not coincidentally, *specifically highlighted* “scale factor” and “magnification of the image” from Shiota’s paragraphs [0024] and [0026] when discussing paragraph [0023]’s “magnification adjustment” feature. Ex. 1003 at ¶ 205 (“[s]ee also APPLE-1012, [0025]-[0026] (explaining that necessary parameters for the image transformation operations include, e.g., the *magnification*

of the image), [0024] (using ‘the *scale factor* (zoom ratio) as the size of the plane image...’)) (emphasis added); POR at 16-17.

Petitioner’s and Dr. Kessler’s backpedaling is predictable since they now admit, as they must, that Mr. Munro accurately describes “scale factor” and “magnification of the image” in paragraphs [0024] and [0026] as relating to the final image display. Reply at 13; Ex. 1023 at ¶ 66; Ex. 2001 at ¶¶ 53-56; POR at 17-19. Mr. Munro credibly interprets “magnification adjustment” at the end of paragraph [0023] within Shiota’s overall context as referring to selecting portions for display, not correcting image distortion using the fisheye image size. *See* Ex. 2001 at ¶¶ 50-58; POR at 17-19. Petitioner and Dr. Kessler, meanwhile, misread paragraphs [0024]-[0026] so poorly that the Reply now minimizes the significance of these paragraphs’ context that Petitioner previously deemed critical for institution. The PTAB should therefore credit Mr. Munro’s finding that Shiota does not teach or suggest retrieving image points on the obtained image using a size L of the obtained image.

2. Petitioner Cobbles Together Disparate and Unrelated Portions of the Record to Salvage its Failed Interpretation of Shiota

Petitioner asserts Patent Owner’s response mischaracterizes Dr. Kessler’s testimony – that he didn’t rely solely on “magnification adjustment,” but included surrounding context of “the image circle diameter varies according to the size of

the image pickup device” and that “a normalized radius of 1 is assumed.” Reply at 7-8.

Petitioner ignores that “magnification” is the key to its entire argument. Without it, the remaining cited language from Shiota’s paragraph [0023] merely describes normalization. Ex. 1012 at ¶ [0023]. Mr. Munro explained that “magnification” would be an odd term to use in paragraph [0023] if Shiota intended Petitioner’s interpretation. *See e.g.*, Ex. 2001 at ¶¶ 51-52; POR at 15-16. Mr. Munro pointed out that magnification in optics typically connotes a dimensionless number (Ex. 2001 at ¶ 52; POR at 15-16) – a fact Petitioner has not disputed (Reply at 8-13). Dr. Kessler admits that the calculation in Shiota’s algorithm to obtain the final p_1 , q_1 coordinates relies entirely upon normalized (or otherwise dimensionless) values – meaning p_1 , q_1 are themselves normalized/dimensionless. Ex. 2006 at 57:21-58:7, 69:5-6, 70:3-71:6; *see also* Ex. 2001 at ¶ 44. It would be unusual for a POSA to understand Shiota to suggest using image size for obtaining coordinates when the stated algorithm outputs dimensionless coordinates and “magnification” is also typically considered dimensionless. Ex. 2001 at ¶ 52; POR at 15-16. This is why Mr. Munro concluded the POSA would review Shiota in more detail to better understand the meaning behind “magnification adjustment.” *Id.* at ¶¶ 53-56; POR at 17-19. Paragraph [0023] leads into the image transformation summary, which uses “scale

factor” and “magnification,” lending further context to “magnification adjustment.” *Id.*

Petitioner’s arguments that normalization is “well known and common in optics” (Reply at 9-11) are also unavailing. Patent Owner agrees that normalization occurs often in optics – but not all normalization relates to image size. Dr. Kessler admits some of Petitioner’s newly cited references are only used to show normalization *generally*, while *none* of the new evidence shows using an image size in the manner suggested by claim 27. For example, normalizing a focal length is not the same as normalizing image height, rendering exhibits 1024 and 1027, which deal with focal length, irrelevant to the ‘990 Patent claims. Ex. 2006 at 32:19-34:14; Ex. 1024 at 2:6-8; Ex. 1027 at 320. As another example, Dr. Kessler cited aberration curves in Smith as showing normalization of a “full field” (Ex. 1023 at ¶ 57), but the curves relate to fields of view, not image height. Ex. 2006 at 42:15-45:10; Ex. 1026 at 53, 199. In any event, Petitioner never highlights a single instance where Smith uses image height (or “GIH”) to reverse any normalization. Reply at 10-11. Dr. Kessler also asserts that Fisher shows a normalized image height but admits that no algorithm is used for displaying the image – a second “reverse” lens with characteristics for mechanically correcting the distortion is placed on a projector. Ex. 2006 at 38:15-39:10; Ex. 2001 at ¶¶ 46-47; Ex. 1009 at 3:43-53; POR at 12.

Relying on this general evidence of normalization, Petitioner attributes Mr. Munro as providing the missing link to their interpretation of Shiota. Reply at 10-11. However, outside of the ‘990 Patent’s described algorithm, Mr. Munro never testified that one needs to use the actual image size to “scale up” a normalized value. *See e.g.*, Ex. 1025 at 20:2-24:10, 25:8-26:21, 37:4-39:13, 50:21-51:15.

Petitioner’s argument that the “magnification adjustment” is performed to account “for the actual size of the image pickup device—and by extension, the actual size of the image—as part of the image transformation” (Reply at 5, 12) is also an unsupported leap. Shiota never states that the magnification adjustment “accounts for the actual size of the image pickup device.” Ex. 1012 at ¶ [0023]. Petitioner then must take the additional step of linking the image size “by extension.” While Shiota notes that sensor size may relate to image size, this is nothing more than a rationale to normalize coordinates. *Id.*; Ex. 2001 at ¶ 58; POR at 15-16, FN3. A POSA recognizes that image sensor size is not the same as image size. Ex. 2001 at ¶ 58; POR at 15-16, FN3. For example, Mr. Munro explained “underfilling,” where the entire image disk can appear on a rectangular image sensor and leave parts of the sensor unused, and “overfilling,” where the image size is bigger than the entire image sensor. *Id.*

Petitioner attempted to discredit this testimony by pointing to an error in Mr. Munro’s description of the ‘990 Patent’s Fig. 2, in turn implying that only

configurations where the sensor diagonal is essentially identical to the image circle diameter matter. Reply at 20-21, FN2. But Dr. Kessler admits that in the relevant applications, an image will exist at an image plane regardless of whether an image sensor is present (Ex. 2006 at 8:11-9:21), *i.e.*, an image will not grow or shrink even if a larger or smaller sensor is substituted. Dr. Kessler further admits that applications exist for which underfilling is useful and that the *very reference he is seeking to modify, Baker*, underfills a rectangular sensor with a full image disk, leaving unused pixels.¹ Ex. 2006 at 17:5-18:6, 23:11-17, 27:6-28:5; Ex. 1006 at 15:54-59, Fig. 4. Contrary to Petitioner’s alleged causal link, even if one is performing an operation to “account” for the size of an image sensor, the image disk size is not necessarily implicated.

B. The ‘990 Patent’s Image Transformation Algorithm Differs from Shiota in At Least One Critical Aspect

Petitioner criticizes the Patent Owner Response because “the image correction techniques described in the ‘990 Patent’s specification” are allegedly “commensurate with” Shiota’s teachings. Reply at 14-22. However, Petitioner glosses over a key distinction between the ‘990 Patent disclosure and Shiota – that

¹ Dr. Kessler admitted another example nearly identical to the ‘990 Patent’s Fig. 2 represented an instance of sensor underfilling with a panoramic image. Ex. 2006 at 19:6-20:8, 21:9-23:3.

the ‘990 Patent algorithm expressly accounts for the image size L while Shiota’s algorithm concludes without ever incorporating this feature.

The ‘990 Patent algorithm begins by calculating Cartesian coordinates E_x , E_y , E_z from a point $E(i, j)$ of a display window DW using angles θ_0 and ϕ_0 corresponding to a viewing direction of the display window DW related to a hemisphere’s center O . Ex. 1001 at 13:31-14:35; POR at 6-7. This determination also includes express use of a selected “Zoom” parameter representing an enlargement of the image sector presented in the display window DW (e.g., $E_y = j \cdot \cos(\phi_0) - \text{Zoom} \cdot \sin(\phi_0)$). Ex. 1001 at 14:6-20, 37-48; Ex. 2001 at ¶ 54; POR at 6-7, 18. By the end of the algorithm, Cartesian coordinates p_u , p_v on the image disk are obtained by multiplying each of two derived coordinates U , V by the distribution function $F_d(\alpha)$ and the size L of the image disk. Ex. 1001 at 13:31-14:35; Ex. 2001 at ¶ 50; POR at 7.

Shiota’s algorithm starts by finding coordinates X_1 , Y_1 , Z_1 of a point P on the display window using points X_0 , Y_0 , Z_0 indicative of the origin of the display window, the u , v coordinates of the point P in the display window plane, and change amounts $(\partial u_x, \partial v_x, \partial u_y, \partial v_y, \partial u_z, \partial v_z)$. Ex. 1012 at ¶¶ [0028]-[0029]; Ex. 2001 at ¶ 43; POR at 11, 18-19. The points X_0 , Y_0 , Z_0 and change amounts relate to the user-selected alterations to magnification in the display window, which Mr. Munro understands “magnification” and “scale factor” to mean in Shiota’s

paragraphs [0023]-[0026]. Ex. 1012 at ¶¶ [0023]-[0026]; Ex. 2001 at ¶¶ 53-56; POR at 18-19. The algorithm concludes by obtaining “second projection coordinates (p_1 , q_1) on the image pickup face” using coefficient k_2 and coordinates X_2 , Y_2 from point P' on the hemisphere. Ex. 1012 at ¶¶ [0033]-[0042]; Ex. 2001 at ¶ 44; POR at 10; Ex. 2006 at 64:2-5, 67:4-7. As Dr. Kessler admits, k_2 , X_2 , and Y_2 are all normalized (or dimensionless), meaning p_1 and q_1 , are normalized as well. Ex. 2006 at 57:21-58:7, 69:5-6, 70:3-71:6; Ex. 2001 at ¶ 44. Shiota's p_1 and q_1 do not incorporate the image size at all, nor does Shiota's algorithm show or describe any further operations performed on either p_1 or q_1 . Ex. 1012 at ¶¶ [0041]-[0042].

The '990 Patent uses the image size to retrieve image points and includes that value in the example algorithm. Shiota's algorithm contains no such variable and, therefore, does not support Petitioner's interpretation of “magnification.” This alone undermines Petitioner's claim that the '990 Patent and Shiota teachings are commensurate. Moreover, Mr. Munro's understanding of paragraphs [0023]-[0026] is tied to the origin coordinates (X_0 , Y_0 , Z_0) and change amounts explicitly recited in Shiota's algorithm, while Dr. Kessler's interpretation has no corollary in any of the listed equations.

Petitioner also introduces a new argument further tying the alleged obviousness to Baker's disclosure of “edge detection.” Reply at 20-21. To the extent Petitioner is using this teaching from Baker to read on a claim element for

which Shiota was previously relied,² or to change the rationale to combine the two references, such use is improper. *See e.g., Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369–70 (Fed. Cir. 2016) (upholding PTAB exclusion of reply brief for relying on a new rationale to combine references); *Google LLC v. Nobots LLC*, IPR2022-00940, Paper No. 38 (PTAB Nov. 29, 2023) (finding improper reply where Petitioner relied on background or common knowledge instead of the originally cited reference); Consolidated Trial Practice Guide (Nov. 2019) at 73 (“Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability”).

Regardless, Petitioner exaggerates the relevance of this disclosure. Baker itself only teaches “edge detection” for ignoring certain pixels when constructing abutting sub-images and generally in “associated processes during the course of manipulation.” Ex. 1006 at 15:54-59, 16:5-18. There is no suggestion in Baker to retrieve image points using an image size determined through edge detection. Mr.

² Dr. Kessler’s testimony implies some new possible reliance on “edge detection” to suggest Baker was already using image size in transformation algorithms (Ex. 2006 at 24:16-25:18), even though the Petition relied solely on Shiota to teach this claim element (*see e.g.*, Petition at 22-27, 50-51).

Munro’s testimony adds nothing further as he merely confirmed that edge detection “*could* be used to detect the extent of the image from the optical [axis],” not that it *was* used for such purpose in Baker or any other prior art reference of record. Ex. 1025 at 49:5-50:15 (emphasis added). Despite Petitioner’s belated attempt to overstate the evidence, edge detection’s general existence provides no further clarity to Shiota’s disclosure. Petitioner has failed to demonstrate the alleged “commensurate” nature of Shiota’s teachings (alone or in combination with Baker) with the ‘990 Patent’s specification.

C. The Reply Contains No Separate Arguments Related to the Challenged Dependent Claims

Petitioner offers no additional arguments or evidence in connection with claims 2, 4, 29, or 30 to remedy the deficiencies in its analysis of claim 27. Reply at 23. Accordingly, claims 2, 4, 29, and 30 should be found to be patentable over the asserted obviousness grounds due at least to their dependence on claim 27.

III. CONCLUSION

For at least the reasons recited above and in the October 10, 2023 Patent Owner Response, Patent Owner requests that the PTAB find the challenged claims not unpatentable.

Date: February 27, 2024

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §§ 42.24(c)(4) and 42.24(d), the undersigned certifies that, according to the “Word Count” tool in Microsoft Word, which was used to prepare this paper, the number of words in this Patent Owner’s Sur-Reply to Petitioner’s Reply is 2,873.

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CERTIFICATE OF SERVICE UNDER 37 CFR § 42.6(e)

I hereby certify that true copies of the foregoing PATENT OWNER'S SUR-
REPLY TO PETITIONER'S REPLY and accompanying exhibits have been served
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